

REMARKS

Reconsideration and allowance of the subject application are respectfully requested. Claims 1 and 7 have been amended and claim 2 has been cancelled in the application. Thus, claims 1 and 3-8 are all the claims pending in the application. Applicant submits that all the pending claims define patentable subject matter.

I. Claim Rejections - 35 U.S.C. § 103

A. Claims 1, 2, 7 and 8

In the Final Office Action dated June 16, 2009, the Examiner rejects claims 1, 2, 7 and 8 under 35 U.S.C. § 103 as allegedly being unpatentable over the background of the Applicant's specification in view of Xiao ("A Novel MC-2D-CDMA Communication System and Its Detection Methods" 2000 IEEE International Conference on Communications, Publication Date: 2000 Volume: 3, Pages: 1223-1227).

By this Amendment, Applicant has amended independent claims 1 and 7 to incorporate the features of claim 2 in order to more particularly point out the invention.

Amended claim 1 is directed to a radio transmitter-receiver and recites, *in part* (emphasis added):

wherein said spreading code that is used in spreading a pilot symbol and said despreading code that is used in despreading are assigned so as to be orthogonal at least in only N chips on the time axis and/or in only M chips on the frequency axis, and
wherein at least one of code that is orthogonal to said despreading code that is used in despreading even if only in M chips on the frequency axis and/or code that is

orthogonal to said despreading code that is used in despreading even if only in N chips on the time axis is preferentially assigned as said spreading code that is used in spreading pilot symbols.

In the Final Office Action, the Examiner contends that the background of the specification and Xiao (page 1224 right side 2nd paragraph) teach all the elements of amended claim 1, which include the original claim 2.

However, the background of the specification and Xiao do not teach all the elements of the amended claim 1.

Claim 1 recites spreading codes that are used in communication so as to be orthogonal on the frequency and/or on the time axis. In this manner, despreading codes can be adaptively assigned by considering fluctuation of propagation paths on the frequency axis and on the time axis, which is an advantage that the technique of Xiao cannot accomplish. On the other hand, Xiao describes that Walsh codes on the frequency axis are multiplied by Walsh codes on the time axis, thereby realizing two-dimensional orthogonal codes.

Further, Xiao does not teach a configuration wherein a pilot code that is orthogonal to despreading code in a time domain or in a frequency domain is preferentially assigned, which provides the advantage of adaptively suppressing inter-code interferences depending on the propagation environment. Thus, Xiao fails to disclose features of amended claim 1, i.e., “code that is orthogonal to said despreading code that is used in despreading even if only in M chips on the frequency axis and/or code that is orthogonal to said despreading code that is used in despreading even if only in N chips on the time axis is preferentially assigned as said spreading code that is used in spreading pilot symbols.”

Therefore, the combination of the background of the specification and Xiao would fail to teach all the elements of claim 1.

In addition, the combination of the background of the specification and Xiao would fail at least because modifying the background of the specification with the teachings of Xiao would render system described in the background of the specification inoperable for its intended purpose. The background of the specification discloses a CDMA system and an MC-2D-CDMA system that use orthogonal spreading codes. A signal that is spread using any combination of the orthogonal codes will effectively be canceled out by a despreading code that is not within that combination, assuming that there is no noise or interference or channel fluctuation. Xiao does not operate in this manner.

Xiao generates a spreading code that includes two components, a_k and c_k , and these components are orthogonal to themselves. However, the total code is not orthogonal. For instance, the 2-bit WALSH codes are (1,1) and (1,-1). This would lead to spreading codes of (1,1,1,1) and (1,1,1,-1) for example. These codes are not orthogonal with each other. These codes would work properly in Xiao, but would not work in the systems disclosed in the background of the specification. The codes are not orthogonal, so the despreading signal in the MC-2D-CDMA system in the background of the specification would not cancel out the signal. As such, modifying the MC-2D-CDMA system of the specification with the teachings of Xiao would render it inoperable for its intended purpose, and would require an extensive redesign to operate properly. Thus, it would not have been obvious to modify the background of the specification with the teachings of Xiao to produce the current invention.

For at least these reasons, Applicant submits that claim 1 is patentable over the cited references.

Amended claim 7 recite features analogous to those of claim 1. Therefore, claim 7 should be patentable for the reasons similar to those submitted for claim 1.

Dependent claim 8 is patentable at least by virtue of its dependency on claim 1.

B. Claims 3 and 4

In the Final Office Action, claims 3 and 4 stand rejected under 35 U.S.C. § 103 as allegedly unpatentable over the background of the Applicant's specification in view of Xiao, and further in view of Uesugi (U.S. Patent App. Pub. No. 2004/0042386).

Claim 1, on which claim 3 depends, is patentable over the background of the Applicant's specification in view of Xiao. Further, Uesugi fails to overcome the deficiencies of the background of the specification and Xiao. Therefore, claim 3 is patentable at least by virtue of its dependency on claim 1 and for these additional reasons.

The device of Uesugi involves modifying the spreading factors in each dimension of a two dimensional spreading code, yet keeping orthogonality between the codes. (Uesugi, paragraphs 54-55). The spreading factor is essentially the length of the spreading code. While Uesugi does monitor the channel fluctuation to determine the optimum spreading factor in the time axis and the frequency axis, it would not make it obvious to use its monitoring function to modify the combination of the background of the specification and Xiao at least because it would be using the function of Uesugi for a purpose other than what it was intended for. Uesugi

monitors the channel situation to determine optimum spreading factors, not to assign spreading codes that are orthogonal on a selected axis.

Further, it would not be obvious to incorporate a means for detecting channel fluctuation into Xiao along with assigning spreading codes based on the channel fluctuation. There is no suggestion in Xiao to assign codes based on channel fluctuation. Instead, Xiao operates by assigning WALSH codes to the M chips of the spreading code and also assigning WALSH codes to the N chips of the spreading code all the time.

For at least these reasons, Applicant submits that claim 3 is patentable over the cited references.

Claim 4 is patentable at least by virtue of its dependency on claim 3.

C. Claims 5 and 6

The Examiner rejects claims 5 and 6 under 35 U.S.C. § 103 as allegedly unpatentable over the background of the Applicant's specification in view of Xiao, and in view of Uesugi (U.S. Patent App. Pub. No. 2004/0042386) and Sudo (US 20040071078) or Sumasu et al (US2004/0028008).

Applicant submits that neither Sudo nor Sumasu et al cure the deficiencies discussed above. Therefore, Applicant submits that claims 5 and 6 are patentable at least by virtue of their dependencies.

II. Conclusion

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

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Respectfully submitted,

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